DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 is a block diagram illustration of an inventive sensor system.

The basic components of a sensor system 1, as shown in FIG. 1, include functions as described, for example, in the cited reference "Hütte." In the present example, the sensor system 1 is based on a sensor unit 10 and an analytical unit 40. In this example, these are supplied with electric power from a power supply unit 50.

The sensor unit 10 is usually accommodated on a silicon chip. The analytical unit 40 is connected to the sensor unit 10 by a plurality of connecting lines. The analytical unit may be spatially separated from the sensor unit 10. The analytical unit 40 may be a small microcomputer or part of a larger automation system. Depending on the application, the sensor unit 10 and the analytical unit 40 can be connected by a single line, by several lines, or even by a data bus. In the present example, the sensor unit 10 includes a sensor element 12 and an output signal generation unit 20. The output signal generation unit 20 includes a unit 22 for processing the measurement variables, an amplifier unit 24, and a sensor-signal processing unit 25.

In this example, some of the circuit blocks are optional, namely the unit 22 for processing the measurement variables, and the amplifier unit 24 (i.e., these circuit elements need not necessarily be part of the sensor unit 10). They are cited in this example only to indicate that the output signal generation unit 20 has circuit elements whose function cannot be varied externally, and circuit elements - in this example, the sensor processing unit 25 - whose function can be varied/controlled externally.

The sensor-signal processing unit 25 includes an analog signal processing unit 27, an analog-to-digital (A/D) converter 29 connected thereto, and a digital signal processing unit 28.

In this example, the analog signal processing unit 27 and the digital signal processing unit 28 are connected to a parameter memory 26.

In this example, the analog signal processing unit 27 provides a plurality of signal outputs $A_1, A_2 \ldots A_k, A_{k+1} \ldots A_K$, which are connected to the analytical unit 40. The digital processing unit 28 also provides a plurality of signal outputs $D_1, D_2 \ldots D_n, D_{n+1} \ldots D_N$ to the analytical unit 40. The analytical unit 40 also receives a plurality of control signal inputs $S_1 \ldots S_i, S_{i+1} \ldots S_I$. The operation of the sensor unit 1 shall now be discussed.

A chemical or physical measurement variable M is input to the sensor element 12 on a line 100. The sensor element 12 preferably converts this physical or chemical measurement variable M into an electrical signal provided on a line 102. For example, the electrical signal on the line 102 can be a voltage or current signal which depends on the measurement variable M, such that its amplitude changes with the measurement variable M. The electrical signal on the line 102 is input to the unit 22 for processing the measurement variables. This unit 22 for processing the measurement variables can be, for example, a current-to-voltage converter. However, it is also conceivable that it converts this preferably electrical input variable into an optical signal. In this example, an internal voltage signal U(M) is generated and provided on a line 104, and the signal amplitude is essentially proportional to the measurement variable M.

It is frequently necessary for this internal voltage signal U(M) on the line 104 to be initially amplified in an amplifier unit 24 to eliminate noisy influences and assure proper signal processing. The amplifier unit provides an amplified signal on a line 106 to the sensor signal processing unit 25.

In the sensor-signal processing unit 25 this amplified signal is processed by the analog

signal processing unit 27. For example, the analog signal processing unit 27 can perform integrations or differentiations. The example indicates that each individual processing step may directly generate an output signal, which can be tapped from the indicated signal outputs A_1, $A_2 \ldots A_k$, $A_{k+1} \ldots A_K$.

In the present example, the operation of the analog signal processing unit 27 can be varied externally by a parameter set. This parameter set is stored, for example, in the parameter memory 26.

Sensor systems of more recent generations generally omit the complicated analog signal processing. Consequently, the circuit component analog signal processing unit 27 will generally not be part of the sensor-signal processing unit 25. However, implementation of such an analog signal processing unit 27, by way of example, should demonstrate that the present inventive idea is certainly not limited to sensor systems with predominantly digital signal processing.

In the present example, such an analog processed signal is now conducted to an analog-to-digital converter 29 that provides a digitized signal to the digital signal processing unit 28. This digital signal processing unit 28 now processes the sensor signal in well-known fashion, and outputs it directly as a parallel or serial signal, or it outputs several parallel or serial signals after various processing steps. Such an interface is identified in the example by signal outputs D_1, $D_2 \ldots D_n$, $D_{n+1} \ldots D_N$.

Operation of the digital signal processing unit 28 can be parameterized by a parameter set stored in the parameter memory 26. EEPROM cells are preferably used for the parameter memory 26. These are preferably situated on the same chip as the other components of the sensor unit 10.